~~sorting the data of the color conversion table so that the data are arranged in~~ order according to a set of grid point numbers in each color component unit; and ~~compressing the sorted color conversion table~~ data.

13. (Canceled)

~~14. (Twice Amended) A computer program product storing a computer~~ readable medium having computer program code for a data processing method of compressing a color conversion table for converting input image data to color component data, having a plurality of color component units, said product comprising process procedure codes for:

inputting data of the color conversion table where combinations of plural color component data are arranged by grid points;

sorting the data of the color conversion table so that the data are arranged in order according to a set of grid point numbers in each color component unit; and

compressing the sorted color conversion table.

REMARKS

Claims 1 to 7, 10, 12 and 14 are pending in the application, with Claim 13 having been canceled and with Claims 1, 2, 5 to 7, 10, 12 and 14 having been amended herein. Reconsideration and further examination are respectfully requested.

Claims 1 to 4, 6, 7 and 13 were rejected under 35 U.S.C. § 103(a) over U.S. Patent No. 6,108,008 (Ohta) and U.S. Patent No. 6,151,025 (Yen); Claims 5 and 10 were rejected under §103(a) over Ohta, Yen and U.S. Patent No. 6,204,933 (Yoshino); and Claims 12 and 14 were rejected under § 103(a) over Yoshino and U.S. Patent No.

5,317,426 (Hoshino). Reconsideration and withdrawal of these rejections are respectfully requested.

Turning to specific claim language, amended independent Claim 1 is directed to an image processing apparatus for converting input color data to color component data, having a plurality of color component units, to be outputted by using a color conversion table. The apparatus includes a first storage, arranged to store at least one compressed color conversion table, wherein data of the compressed color conversion table are arranged in order according to a set of grid point numbers in each color component unit, an expander, arranged to expand the compressed color conversion table, and a converter, arranged to convert the input color data to the color component data using the expanded color conversion table.

In this manner, the invention of amended independent Claim 1 utilizes an efficiently compressed color conversion table which can be expanded and used for converting color image data, thereby reducing the necessary storage capacity required for the conversion process. (Specification, page 2, line 14, to page3, line 9). In the present invention, the color conversion table is compressed by arranging alignment of the data in the color conversion table. (Figures 2A to 2C).

The color conversion table stores data in order of grid point numbers as shown in Fig. 2C, and each data corresponding to each grid point number is combined with plural component data. As seen in Fig. 2C, the data of grid point "2" is "64, 64, 0, 191" for the CMYK color components. In addition, as seen in Fig. 2C, a column C (cyan) is provided having "0, 64, 128, 192, 255, 64, 64, ... 0, 0, 0, 0, 0", and a column Y (yellow) is provided having "0, 0, 0, 0, 0, 64, 0, ... 255, 191, 127, 63, 0". So, according to the present invention, the data is aligned in order of the grid point numbers in each color component such that data of the same value is consecutively continued as much as possible. This is

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evidenced by the five zeros (0's) at the end of the C column, and at the beginning of the Y column. In this manner, the color conversion table is efficiently compressed. This efficient arrangement of color data in order of the grid point numbers in each color component is shown in Fig. 3.

The applied art, namely Ohta, Yen, Yoshino and Hoshino, is not seen to disclose or suggest the foregoing features of amended independent Claim 1. In particular, the applied art is not seen to disclose or suggest storing at least one compressed color conversion table, wherein data of the compressed color conversion table are arranged in order according to a set of grid point numbers in each color component unit, expanding the compressed color conversion table, and converting the input color data to the color component data using the expanded color conversion table.

Ohta is seen to be concerned with rendering a preview image as it would appear if it were formed by a predetermined image device, wherein the rendered preview image is created using a stored profile which corresponds to the predetermined image forming device. (Ohta, abstract; Figure 2; and column 1, lines 60 to 67). Although Ohta is seen to disclose the use of three-dimensional look-up tables (LUT) for converting Lab color space to CMYK color space, the three-dimensional look-up tables in Ohta are not seen to be compressed and are not seen to have the data contained therein arranged in order according to a set of grid point numbers in each color component unit. (Ohta, column 13, lines 20 to 48).

Yen is not seen to remedy the foregoing deficiencies of Ohta. Specifically, Yen is seen to utilize a compressed look-up table for use in two-dimensional linear convolutions for image processing. (Yen, abstract; and column 4, lines 51 to 67). The look-up table of Yen is merely seen to contain partial results which are obtained by determining possible patterns for a row of an input pixel window and multiplying the

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possible patterns by a corresponding row of a convolution kernel matrix. (Yen; column 5, lines 17 to 25). In this manner, the calculation results are pre-stored in the look-up table for application to an actual row of an input pixel window, thereby saving calculation processing time during convolutions for image processing, such as for a smoothing operation.

However, the lookup table of Yen is not seen to have a compressed color conversion table wherein data of the compressed color conversion table are arranged in order according to a set of grid point numbers in each of a plurality of color component units. The lookup table in Yen is not seen to be concerned with plural color components, much less wherein the data is arranged in order according to a set of grid point numbers in each color component unit.

Neither is Hoshino nor Yoshino seen to remedy the foregoing deficiencies of Ohta and Yen. In particular, Hoshino is seen to be directed to transforming a color image from a first color gamut to a second color gamut. (Hoshino, abstract; and column 3, lines 1 to 45). Hoshino is seen to use look-up tables 211 to 213 in order to convert CMYK image data to compressed CMYK image data. (Hoshino, column 6, lines 40 to 45). The compressed CMYK image data is then converted to RGB image data for display on a color CRT. (Hoshino, column 6, lines 46 to 49). Look-up tables 211 to 213 of Hoshino are seen to constitute a first color conversion means, but are not seen to themselves be compressed. Instead, they are simply seen to be used to output compressed image data. (Hoshino, column 6, lines 40 to 56). In particular, the term "compressed" as used in Hoshino is seen to be directed to converting CMYK print data to CMYK print data as it would be rendered by a printing device having a compressed color gamut. (Hoshino, column 7, lines 55 to 58). The color image data as it would be rendered by the compressed color gamut of the output device is then converted to RGB for display on the CRT so as to provide a preview

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of the color image data as it would appear in the compressed color gamut of the output printing device. (Hoshino, column 6, lines 30 to 54). However, nowhere is Hoshino seen to disclose or suggest that the look-up tables 211 to 213 themselves are compressed in size so as to reduce the required storage capacity as in amended independent Claim 1. In addition, Hoshino is not seen to disclose or suggest arranging color data in order according to a set of grid point numbers in each of a plurality of color component units.

Yoshino is seen to be directed to the use of compressed image data to pass to a printer which expands the compressed image data for printing, for efficient print data transmission and memory use. (Yoshino, abstract; and column 2, lines 1 to 15). Yoshino is merely seen to select a particular type of color processing table to carry out color processing for a color printer. (Yoshino, Fig. 16; and column 9, lines 45 to 51). However, Yoshino is not seen to disclose or suggest a color conversion table in which color data are arranged in order according to a set of grid point numbers in each of a plurality of color component units.

Applicant respectfully submits that the applied art, either alone or in combination, are not seen to disclose or suggest the foregoing combination of amended independent Claim 1. (M.P.E.P. § 2143).

Based on the foregoing amendments and remarks, amended independent Claim 1 is seen to be in condition for allowance, and such action is respectfully requested. In addition, amended independent Claim 7 is directed to an image processing method which includes substantially similar features as those of amended independent Claim 1. Amended independent Claim 7 is therefore also believed to be in condition for allowance for the same reasons discussed above with respect to amended independent Claim 1.

Amended independent Claim 12 is directed to a data processing method of compressing a color conversion table for converting input color data to color component

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data, having a plurality of color component units. The method includes inputting data of the color conversion table where combinations of plural color component data are arranged by grid points, sorting the data of the color conversion table so that the data are arranged in order according to a set of grid point numbers in each color component unit, and compressing the sorted color conversion table data.

As mentioned above with respect to amended independent Claim 1, none of the applied references are seen to disclose or suggest a color conversion table in which the data of the color conversion table is sorted so that the data are arranged in order according to a set of grid point numbers in each of a plurality of color component units. Neither are any of the applied references seen to teach that such a color conversion table is compressed.

As stated above, Hoshino is not seen to disclose or suggest that look-up tables 211 to 213 of Hoshino are themselves actually compressed, but are instead seen to merely be used to convert CMYK image data to CMYK image data in a compressed color space. (Hoshino, column 6, lines 40 to 54). In addition, as admitted in the Office Action, Hoshino is not seen to disclose or suggest sorting the conversion table data in a color component unit.

In this regard, Yoshino is not seen to remedy the foregoing deficiencies of Hoshino with respect to independent Claim 12. In particular, Yoshino is seen to be directed to the use of compressed image data to pass to a printer which expands the compressed image data for printing, for efficient print data transmission and memory use. (Yoshino, abstract; and column 2, lines 1 to 15). It is stated in the Office Action that Yoshino teaches sorting the conversion table data in a color component unit. Applicant respectfully disagrees with this assertion. In particular, the portion of Yoshino cited by the Examiner is simply seen to be related to the process performed by color laser printer 21a as

shown in the flowchart of Figure 16. In this regard, in the case of processing a color print, color laser printer 21a sets a sort of table necessary to carry out the color processing. (Yoshino, column 9, lines 45 to 51). This description of setting a necessary color processing table merely means that a necessary "sort" of table is selected, and is not seen to mean that data of a particular table itself is sorted, much less wherein the data in the table is sorted in order according to a set of grid point numbers in each of a plurality of color component units.

Accordingly, the applied art, either alone or in combination, is not seen to disclose or suggest the combination of features of amended independent Claim 12. Accordingly, amended independent Claim 12 is believed to be in condition for allowance, and such action is respectfully requested. In addition, amended independent Claim 14 is directed to a computer program product which includes substantially similar features as those of amended independent Claim 12. Amended independent Claim 14 is therefore also believed to be in condition for allowance for the same reasons discussed above with respect to amended independent Claim 12.

The other pending claims are each dependent from the independent claims discussed above and are therefore believed patentable for the same reasons. Because each dependent claim is also deemed to define an additional aspect of the invention, however, the individual consideration of each on its own merits is respectfully requested.

In view of the foregoing amendments and remarks, the entire application is believed to be in condition for allowance, and such action is respectfully requested at the Examiner's earliest convenience.

Applicant's undersigned attorney may be reached in our Costa Mesa, CA office at (714) 540-8700. All correspondence should continue to be directed to our below-listed address.

Respectfully submitted,

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APPENDIX

VERSION WITH MARKINGS TO SHOW CHANGES MADE TO CLAIMS

1. (Twice Amended) An image processing apparatus for converting input color data to color component data, having a plurality of color component units, to be outputted by using a color conversion table, said apparatus comprising:

a first storage, arranged to store at least one compressed color conversion table, wherein data of the compressed color conversion table are arranged in order according to a set [based on positions] of grid point numbers [points] in each [a] color component unit;

an expander, arranged to expand the compressed color conversion table; and

a converter, arranged to convert the input color data to the color component data using the expanded color conversion table.

2. (Twice Amended) The apparatus according to claim 1, further comprising a second storage arranged to store the expanded color conversion table.

5. (Twice Amended) The apparatus according to claim 1, further comprising a sorter arranged to sort data included in the expanded color conversion table while a combination of output color components of a grid point is kept.

6. (Twice Amended) The apparatus according to claim 1, further comprising:

an input section, arranged to input a command indicative of print instruction and data indicative of a print medium characteristic; and

a selector, arranged to select one of color conversion tables expanded by said expander in accordance with the data indicative of the print medium characteristic.

7. (Twice Amended) An image processing method of converting input color data to color component data, having a plurality of color component units, to be outputted by using a color conversion table, said method comprising the steps of:

expanding a compressed color conversion table, wherein data of the compressed color conversion table are arranged in order according to a set [based on positions] of grid point numbers [points] in each [a] color component unit; and

converting the input color data to the color component data using the expanded color conversion table.

10. (Twice Amended) The method according to claim 7, further comprising the step of sorting data included in the expanded color conversion table while a combination of output color components of a grid point is kept.

12. (Amended) A data processing method of compressing a color conversion

table for converting input color [processing] data to color component [used in] data, having a

plurality of color component units [conversion], said method comprising the steps of:

inputting data of the color conversion table [data] where combinations of plural

color component data are arranged by grid points;

sorting the data of the color conversion table so that the data are arranged in order

according to a set of grid point numbers in each [a] color component unit; and

compressing the sorted color conversion table data.

14. (Twice Amended) A computer program product storing a computer readable

medium having computer program code for a data processing method of compressing a color

conversion table for converting input image data to color component [used in] data, having a

plurality of color component units [conversion], said product comprising process procedure

codes for:

inputting data of the color conversion table [data] where combinations of plural

color component data are arranged by grid points;

sorting the data of the color conversion table so that the data are arranged in order

according to a set of grid point numbers in each [a] color component unit; and

compressing the sorted color conversion table [data].